PETRALOGY, OR THE KNOWLEDGE OF ROCKS AND STONES.

BY HENRY G. MONTAGUE, ESQ., PROFESSOR OF NATURAL PHILOSOPHY.

(*Continued from p. 363.*)

Following up the chain of reasoning I held last, I will first, previous to entering further into the siliceous rocks, define to the reader the nature and origin of clay, or aluminous earth; so termed, because its base is almost invariably composed of the earth alumina, or otherwise it is the preponderating ingredient. In tracing the origin of clay, and the various modifications of mixture that it undergoes, we cannot sufficiently admire the wonderful provision of nature by which she accomplishes results perfectly analogous to each other, not only from varied materials, but also by varied action. It is by attentive observation of nature alone, and not by means of the crucible or the alembic, that we are enabled to arrive at a knowledge of *first causes*, which, from their obscurity and perplexity, are the forbidden fruit of modern men of science. For although the analysis of organic and inorganic bodies ever exhibits certain unvarying results, which enable us to classify and arrange elementary principles and compounds; although it is affirmed that all things known to us may be resolved into oxygen, hydrogen, nitrogen, and carbon, which affirmation has not yet, nor, in all human probability, ever will be verified; yet, in nature, the aluminous results seldom exist presented by the chemist, although the result satisfactorily proves that the elements of these bodies exist in the body analyzed.

CLAY is the resolution of putrescent animals and vegetables, produced upon the surface of the earth and in the waters. In its primary state, it is a carbonaceous product, consisting chiefly of, and known as, vegetable mould or soil; and in this state it is the *humus*, so much talked of by modern chemists. To this humus is added acids, alkalies, and alkaline earths, in varying proportions, which are abstracted from, and finally returned to, the soil, on which the vegetable bodies exist; or it is deposited over tracks of the earth, in the ocean-bed, or by rivers and running streams, which abstract it from the lands through which they flow. Its nature is, therefore, under all circumstances, very variable, and its combinations almost indefinite; consequently, the rocks formed by the consolidation of its beds partake of the like character of irregularity and disposition of parts, quantities, and qualities.

An island, or a large continent, no sooner becomes elevated above the waters, and becomes exposed to a warm, humid climate, than the process of vegetation commences, species springing spontaneously from the soil, or being wafted thither by the winds, the waves, and birds; and with the development, growth, decay, and dust of these species, vegetable mould is generated, and where the position is favourable, gradually increased. While in the friable or unwashed state, this material is termed mould; but when digested in marine or saline waters, and amalgamated with animal matters, it rapidly passes into the state of clay; the nature of the clay, as previously observed, depending on the nature of the material from which and by which it is produced. Its character is now changed from a carbonaceous to an aluminous product; and mineralogy then describes it as sordid, viscid, slippery to the touch, impalpable, without regular shape, tough, opaque, and becoming plastic by the addition of moisture; in its primary state and place moist, becoming friable when dry, hardening by iguition, not fusible by the greatest degree of heat; but when mixed with other heterogeneous substances, becoming variously shaped by fire, hardens into slate of varieties, rocks and stones, sometimes talcose, which, by resolution, is reproduced in mica, a scaly, opaque, flexible, and shining substance.

Clay, generally speaking, consists of alumine and silex—that is, the common, viscid matter united in variable proportions with sands, as every one may observe in the beds and on the banks of rivers; and with these are blended various substances, as the accidents of union may determine, being generally sulphates of iron, lime, magnesia, and other earths and inflammable products; it imbibes and retains water and oil, by each of which it is softened, being rendered plastic by the former; it does not effervesce with nitric acid, contracts and becomes harder in the fire. There are numerous varieties known, as porcelain clay, pipe clay, potters' clay, fullers' earth, Lemniaq earth, soap clay, common brick clay, Stourbridge clay, indurated clay, schistose clay, bole, earth of stragorium, cimolite, Chinese clay, red ochre, yellow ochre, green bole, tripoli, kollyrite.

Native alumine is the constituent of a salt called alum; it is also the chief constituent of clays or argillaceous compounds, eight parts of oxygen combined with nine parts of the earth aluminum, to form seventeen parts of oxide of aluminum or alumina. All bodies have this distinguishing basis, and the chief constituents are termed aluminaries. Argillaceous earths are the parents of aluminous, crystalline, and concrete aggregates: considered in their relative position to calcareous earths, they are secondary results, but generating perpetually with calx and silica, they are also secondary, recent, and still producing.

Having thus far given the origin of a material so universally diffused in and upon the superficial crust of the earth, and performing a most important part in the economy of nature, manifest in the fossil and mineral kingdom, I will not proceed in my description of those rocks, of which I have previously spoken.

The phenomena of intersecting other beds and running in veins and fissures, is not confined to granite, being common to those varieties of rock known as porphyry, trap, and basalt, and which geologists describe as volcanic. In the coal-districts of this country, we find a vast number of faults, as they are termed, filled in with an exceedingly hard, dark-coloured mass, porphyrytic or basaltic, which the miners call clunch, and from the circumstance of its affecting the beds against which it rests, penetrating their material, and, in some cases, rendering them more highly crystalline, geologists have supposed the material to have been at one time in the heated liquid state of melted lavar. In order to account in a rational manner for the circumstance of one bed intersecting another, we have only to look at the operation of natural causes in the present day. The continued action of streams opens a channel through a thousand beds, varying from each other, sometimes in a direct line, sometimes tortuous, sometimes diverging right or left. Rivers in tropical climates throw out numerous branches; in one place we find them scooping out channels; in another place, filling up with the materials held in suspension by the waters channel veins, and extensive fissures formed by various causes. Again, when sedimentary deposits are carried into the ocean, and are deposited over an extensive surface of its bed, it often happens that so long as those deposits are forming, so long the bottom of the ocean is here and there disturbed by tidal lines or ocean currents, varying in their breadth; and when this is the case, the sedimentary matter is carried away in the line of action and deposited elsewhere. Thus, for instance, if pure vegetable earths and other carbonaceous matters are periodically deposited, preparatory to their transition into the state of coal, the whole accumulating bed will be cut right across by the tidal line, and a fault is naturally formed, the beds on each side of this fault preserving the same thickness. Again, other faults are the results of rents and fissures, which very often fill in fragments of the separated beds, and such matters as may happen to form the surface soil which are carried in by the rains, or by streams. Thus the fissures in the Devonshire strata are filled in with a material termed toad-stone, which is a species of Siderite. The basaltic dykes, which pass through chalk, in the island of Rathlin and other places, convert it into granular crystallized limestone, the rock in contact with the muddy deposit absorbing the hydrogen whereby its atomic particles were enabled to expand in the crystalline form. Heat would not produce this effect; the presence of water is a condition of crystallization.

The porphyry peculiar to the country around Christiana, says Von Buch, traverses clay in innumerable veins: the multitude of them is incredible; on every hill new ones break out and create confusion, when we wish to follow the same vein throughout its course to its termination. They frequently traverse the clay-slate at right angles, often almost perpendicularly; and in the direction and inclination there is also an infinite diversity, and many of these veins must necessarily traverse each other. Their thickness is from ten to fifteen fathoms and upwards, and veins of less than a fathom I never remember to have seen. All these spaces are, however, filled with a sort of porphyry, which is completely similar to that which, as a widely extended formation, and in high mountains, we find at only a mile distance: a remarkable example of the filling-up of the veins with the formation which covers these repositories, and an important fact with respect to the theory of veins in general. Porphyry veins are also found in these mountains, traversing clay-slate and limestone: the porphyry of the mountains presents a vast perpendicular front resting upon sandstone, and this again resting upon limestone. Professor Jamieson also tells us that in the island of Arran porphyry occurs in veins and mountain masses, over red sandstone, containing coal and limestone full of petrifactions.

Von Buch truly remarks, that "the great course of nature is one and the same, from the coagulation of granite to the career of man." The concretion of a small mass of earths, variously blended together, and uniting solid bodies within its matrix simply by the force of cohesion, is but the type of action and result by which nature forms the most stupendous rocks: the common phenomena of cracks and rents of a small piece of clay occasioned by summer heat, and the filling-in of these rents with a liquified mass of earth is typical of the filling-in of rents and fissures, such as are common to hot climates, extending many fathoms wide, of vast depth and length. In all these phenomena there is no necessity for the violence of volcanic action; beds upon beds are rent asunder, but without violence, and nature repairs the evil without violence, and the intruding matter is generally such as we recognize as forming one or the other of the overlying beds, differing from it only when subject to different conditions, such as amalgamating with other matters, or by the mineralizing process becoming more compact, silicified, or crystalline.

(*To be continued.*)

TIMBER—ITS TREATMENT AND USES.

BY JAMES WYLSON.

(*Continued from p. 374.*)

29. OAK when thoroughly seasoned is so very durable that its application is advisable in almost all cases where there is great exposure to the weather, it seems calculated to endure for ever, either in the earth or in dry carpentry above ground; in water it is almost equally so, but in moisture it is more perishable, and when taken from bogs is found to be brittle and in progress of decay; when exposed to the action of sea-water it is, like other woods, subject to the operations of pipe-worms; but they seem but small and poorly-nourished, and to make much slower progress than in such woods as the fir and alder. For all purposes where strength is required, and the degree of flexibility it possesses, and its tendency to warp in drying, are not materially objectionable, oak is suited in the highest degree. It makes the best king-posts, because it is least compressible by the ends of the principal rafters:* for ceiling-joists it is *not* calculated, because subject to warp. In wainscot joinery the presence of nails about the surface should be avoided, on account of a discolouration which takes place around them, if driven in before the wood is quite dry; this circumstance has more than once determined the question of identity, where it was doubted whether the material in some old work was oak or chesnut, the absence or presence of the stain about the bolts denoting which it was, since it is peculiar only to the former: the powder to which oak crumbles in its rotten state is of a fine snuff-brown colour.

30. FIR.—Of this useful description of timber there are various species; the most important, which is the red or yellow, being from what is called the Scotch fir, a tree which is a native of the Scottish Highlands, and almost all other parts of northern Europe; it is common, and thrives in the highest degree, in

* [We believe in most cases fir is better than oak for king-posts; the latter, by its ordinary immature seasoning, warping and shrinking, after use, so much, as to derange the work greatly.—ED.]

For more information on PDF Compression and OCR visit our website